AGRICULTURAL NEWS LETTER

VOL. 25 No. 2 SPRING 1957

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

DU PONT
REG U S PAT OFF

ISSUED BY PUBLIC RELATIONS DEPARTMENT E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DEL.

AGRICULTURAL NEWS LETTER

Published Quarterly by the Public Relations Dept.
E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Wilmington 98, Delaware
O. J. DEKOM ..... *Editor*

DU PONT AGRICULTURAL ADVISORY BOARD

NELSON ALLEN .....*Packaging Films*
D. C. BOUGHTON .. *Animal Diseases and Parasites*
A. E. CARLSON ..... *Weed and Brush Control*
EDMOND C. FETTER, *Rubber and Rubber Chemicals*
F.G.KEENEN, D.W.KOLTERMAN, *Nitrogen Products*
JAMES WADDELL ..... *Animal Nutrition*
DALE E. WOLF ..... *Agricultural Pesticides*

. The AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and new ideas in the field of agriculture, particularly as they are related to advancements through research. Material appearing herein may be reprinted in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

This publication is available on microfilm. Beginning with Volume 17 (1949), it may be obtained in this form from University Microfilm, 313 North First Street, Ann Arbor, Michigan. The cost is $1.50 per volume, plus 10 cents for packaging and mailing. All orders should be sent to Ann Arbor.

MAN IN THE BLUE DENIM SUIT

U. S. farmers, whether they intend it or not, are rapidly becoming a new class of American Executives.

The word "executive" ordinarily brings to mind the picture of a greying but vigorous business man, clad in a grey worsted suit and striped tie, talking into two phones held in hands immaculately clean, directing the energies of many men and women, and controlling the flow of thousands—or more likely, millions—of dollars.

But this stereotype version of the American executive fails to identify the real characteristics that distinguish an executive from other men: his capacity for **planning,** his ability to **organize,** his knack for **making tough decisions** reaching well into the future, his acceptance of the ultimate **responsibility** for the failure or success of his business, his **experience and training** that enable him to find and use information gleaned from all the resources that can help him in his oprations.

The successful farmer today demonstrates all these talents.

He must plan carefully the management of his acres and the husbandry of his animals in order to meet the shifting needs. of the market. He must be shrewd in the investment of his income so as not to tie up too much cash in supplies or be forced to buy when prices are most critical. He must have available enough tools and machines to get maximum production, but he cannot afford to buy more equipment than his farm will support. He needs to be familiar with government laws and rules that seem to multiply and to change as fast as they grow. He must be a tax-computor and, if he keeps a hired hand or crew, a tax-collector as well.

Perhaps as important as all these is his ability to draw upon the thousands of sources of information which today describe facts, figures, products and techniques that may be useful to the farmer. State agricultural schools are busy with research into many of the problems affecting the farm economy. Industry, too, recognizing the farmer as a major supplier and customer, works constantly to develop new materials, new tools, new chemicals and even new techniques that may lighten the labor on farms and help to stabilize the farm income.

For all these reasons, the farmer's day is no longer done when he returns to the house from the fields or barns. Evening visitors are likely to catch the man in blue denim at his desk in the parlor studying the latest treatment for mastitis, or closely calculating how he can paint the tractor shed with money left over from the bean crop.

This after-supper toil is executive work of a high order.

IN THIS ISSUE

Man in the Blue Denim Suit 2
Atomic Energy to Bring Great Changes in Farming 3
Hybrid Vigor in Poultry 4
The Farmer and the Businessman 6
Anti-Knock Agents for Increased Livestock Production 8
New Products and Applications 10
Crop Uses of the Substituted Urea Herbicides ... 12
DDT Safety Factor Established 13
Sun's Energy May Provide Water for Parched Lands 15
Taxes Are a Cost of Doing Business 17
Du Pont Grants One Million Dollars to Education . 18
Farmers Ask About 19

ATOMIC ENERGY TO BRING GREAT CHANGES IN FARMING

Peacetime use of atomic energy can bring about as big a change in agriculture as did the Industrial Revolution in the 19th century, according to H. B. Tukey, professor of horticulture, Michigan State University. Atomic radiation can speed breeding of improved varieties of plants. It may be used in pasteurization and sterilization, as well as for insect and disease control. Radioactive tracer atoms are already being used widely to discover new facts about plant and animal physiology and water improvement.

Atomic power will bring increased quantities of water if used to tap such sources as the great lakes or to desalt sea water. With it, synthetic fertilizers might be made more abundant and cheaper, while synthetic foods may be created. Transportation should be less costly and speedier with the application of atomic power.

Concrete laboratory evidence on the application of atomic energy to the creation of animal feeds has already been found. LeMar Remmert, chemist at the Oregon State College, has reported that the cellulose in sawdust exposed to high-level beta and gamma rays (which result from atomic fission, or which can be created electrically) undergoes chemical change which permits digestive enzymes of cattle to convert the material into usuable body sugar. The work has so far been carried out only in laboratory experiments.

Industrial Research

Industry is also doing extensive research in peacetime use of atomic energy. Significant changes in manufacturing and products will undoubtedly result and greatly affect both agriculture and life in general. Du Pont, builder and operator of three atomic energy plants for the Government, has several research teams studying use of radiation in chemical manufacturing.

There are many potential advantages in the use of atomic radiation in chemistry. The tremendous energy of atomic particles (which can be millions of times greater than the energy involved in a normal chemical reaction) can blast apart or blast together molecules in reactions which can now be accomplished only under great pressure, with great heat, or in the presence of catalysts.

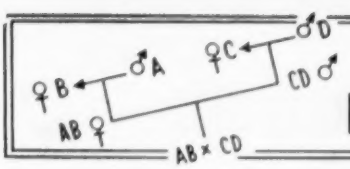
If such reactions can be achieved through bombardment with high-energy radiation or atomic particles, it might avoid contamination which can result from catalysts.

Greater Force

Atomic energy is, in some ways, similar to other forms of energy, such as heat and light, except that it has vastly greater force and the strong additional capacity of acting as a sort of catalyst. While this type of energy has been known to scientists for many years, its application to industrial chemistry has been greatly speeded by recent concentration on atomic energy development and the realization of the tremendous amounts of radiation which could become available from the national atomic energy program.

Because little is as yet known of the chemical effects of atomic radiation, developments must depend almost entirely on practical, day-to-day experimentation. At the present time, the outcome of radiation reactions cannot be accurately predicted and the extent to which new products are developed by such means will depend on the outcome of thousands of experiments.

SCIENTIST controls atomic-type radiation generated by Van de Graaf accelerator. Because of hazard of operation, "business end" of equipment is observed in mirror at left of controls.



making the most of

HYBRID VIGOR IN POULTRY

By DON C. WARREN

(Excerpts from an article in "Poultry Comment," a Du Pont publication. From 1948 until recently, Dr. Warren was Coordinator, U.S.D.A. Regional Poultry Breeding Research Project, Purdue. He was president of the Poultry Science Association, 1941-43.)

A significant trend in poultry breeding in recent years has been the use of breeding techniques to take advantage of heterosis or hybrid vigor. Whether it be breed crosses or strain crosses, the objective, is the same—to obtain increased growth, vigor and/or egg production. Unfortunately, we do not understand too well the nature of heterosis.

Cross-breeding of poultry has been a common practice for more than 30 years in England, where emphasis on vigor was somewhat secondary to the advantage of identifying sex at hatching time by means of sex-linked characteristics expressed through crossing two different breeds.

In America, crossbreds have been used commercially for some 20 years, with the Austra-White being that used most widely, especially on the West Coast, for egg production. In the East, the so-called Sex-Links, produced from mating New Hampshire or Rhode Island Red males on Barred Rock females, has been very popular for egg production purposes. Crossbreds have been used extensively for meat production since establishment of the commercial broiler industry.

Strain-Crossing is Popular

In breeding for improved egg production, the results in recent years have not met the theoretical expectations. In fact, some progressive breeders believe that the conventional selection based on individual and family merit have given little advancement recently. Being confronted with this situation, many poultry breeders have been receptive to any new techniques which might help them.

Strain-crossing in poultry has been used commercially on a large scale only in the past few years. The utilization of strain crosses was perhaps delayed by the belief that wide divergence of origin of the parent stocks was necessary to obtain the desired qualities in the offspring. In general, this holds true but through proper diligence in search of good combinations, and by careful testing, strain crosses have been found showing outstanding performance.

Finding Better Combinations

Crosses of strains of White Leghorns are now extensively used. Strain crosses avoid some of the objectionable qualities of crossbreds, such as tinted egg shell color. Strain crossing also affords the breeder some protection of his product which has not been possible when handling pure breeds. Without this protection, the scientific efforts in poultry breeding have not been properly remunerative and a breeder without a retail hatchery operation has not remained in business long. Like crossbreds, not all strain crosses are superior and the problem of the breeder is to find the better combinations. The increased tendency on the part of the poultry breeder to withhold his pure stocks from commerce will make this problem more difficult in the future.

A more recent development in the utilization of heterosis has been a breeding method known as recurrent reciprocal selection which is actually selection for improved combinability. After two breeds or strains showing good combinability are found, a selection program to improve their combining qualities is inaugurated. It is the application of a progeny test for improvement of cross performance. Breeding birds are chosen on the basis of how their progeny perform rather than on their own performance.

Sires and dams for perpetuating strain A are chosen on the basis of the performance of their progeny when strain A is mated with strain B, and strain B is perpetuated in the same manner. When two strains or breeds are found which combine in a superior manner, it is assumed that their genetic constitutions are responsible and it should be possible through progeny testing to im-

prove the manner in which they combine. Theoretically, recurrent reciprocal selection should do everything that is accomplished by inbreeding and hybridization without the excessive costs involved in developing and maintaining large numbers of inbred lines.

Techniques Well Known

The techniques of inbreeding and hybridization in poultry are fairly well known since they are used extensively in the development of hybrid corn. This is also a method of selection for combinability but here the selection is applied in the choice of inbred lines to combine. In the case of recurrent reciprocal selection method, selection is also exercised when choosing stocks to combine and again later to improve their combinability. In the case of crossing inbred lines, no further change can be made in the resulting hybrid, but improvement is accomplished by substituting new inbreds in the combination or forming new combinations.

To utilize hybrid vigor, the breeder may simply test a large number of breeds or strain crosses in order to find a superior combination and then use this as a commercial product. The more progressive breeders continue their selection program to improve the combinability of the stocks. Those using inbreeding and hybridization have a similar objective but they follow a quite different course to attain the end. Commercial stocks produced by all these techniques are now in competition and the future holds the answer as to which will give the best results.

Breeding for Egg Production

For purposes of improving egg production, all of the previously described techniques have been used. By far, the most common method is strain-crossing with or without recurrent reciprocal selection. Chicks of this sort are used widely by breeders who arrange franchise agreements with hatcherymen.

Breed crosses are also used for egg production. If the breeds crossed differ in egg shell color, the resulting tinted egg shell causes marketing difficulties in some areas. Crossing does not appear to reduce adult mortality as it does chick mortality. Crossing of both strains and breeds seems to intensify to a degree broodiness. These problems are also encountered in inbreeding and hybridizing.

Crossbreeding plays a prominent role in the production of broilers and will probably be increasingly important in the future. The broiler industry was founded on the Barred Rock-New Hampshire or Rhode Island Red cross. This cross is relatively little used now, since crosses involving the dominent white plumage color have entered the picture.

Breeding Broiler Stocks

The broiler industry has not used strain crosses to any degree. Also, inbreeding and hybridization have not been utilized for producing broilers. Selection for improved combinability of different breeds is common. New Hampshires and White Plymouth Rocks are the two pure breeds used most extensively in broiler production and they are being used most in crossbreeding. Frequently, the stock used on the male side of the cross is a synthetic one, commonly having a partial Cornish origin.

To reduce the cost of broiler production, meat qualities and growth are emphasized on the male side of the cross, and egg production on the female side. Growth rate is one of the most important traits of broiler stocks and it generally is enhanced by crossing. Crosses designed to take full advantage of this phenomenon will play an important part in the broiler production of the future.

It is obvious that there are radical changes in progress in the breeding of poultry. Although there is a tendency to get away from pure strains as commercial products, at the same time all of the present day breeding programs are dependent on the pure strains and thus will have to pay a premium for such stock. Conventional methods involving selection on individual and family merit seem to be receiving decreasing emphasis although they are essential for producing basic stocks for use of heterosis.

When the existing germ plasm of pure breeds has been fully exploited for crossbreeding, and this point is rapidly aproaching, those relying on heterosis may find it necessary to resort to older methods to replenish their stocks.

The chicken is assuming the role of a laboratory animal in America and the extensive studies in population genetics now underway will evolve techniques of breeding not only for poultry but also for the larger and slower breeding domesticated animals.

Men of Fiction . . .

THE FARMER AND THE BUSINESSMAN

Truth may be stranger than fiction, as the old saying has it, but not when it comes to the picture fiction has built of the farmer and the businessman, and of their relationship to each other. The man in the gray flannel suit and the man in the overalls have been painted with lurid brushes by the writers of books and the makers of motion pictures. If the picture presented were true, neither one would any longer exist — the farmer because he would not have been bright enough to survive, and the businessman because he would by now have destroyed all of his consumers and suppliers.

It is unfortunate that the distorted images conjured up by the writers have been allowed to endure, almost unchallenged. Literature has a way of influencing opinion, even among those who are never exposed to its magic. Books are read by those who mold public opinion, especially by the academic world whose words carry impressions and ideas far beyond its own circle. Thus we find that legends become perpetuated and the picture of farmer and businessman as adversaries rather than partners is often engraved in the public mind.

Fictitious Conflict

Novelists from Frank Norris to John Steinbeck, poets from Sidney Lanier to Archibald MacLeish have given us incredible portraits of farmer and businessman, plus a story of bitter conflict between the two which has never existed in real life.

It was Lanier who in the period after the Civil War included these lines in his famous poem, "Corn", (1877) to describe the American farmer:

"And all his best-of-life the easy prey
Of squandering scamps and quacks that lined his way
With vile array,
From rascal statesman down to petty knave;
Himself at best for all his bragging brave,
A gamester's catspaw and a banker's slave."

Perhaps the most popular expressions of conflict between farmer and businessman was poured out of the virulent pen of Frank Norris. His picture was included in the "Epic of the Wheat," an intended trilogy dealing with the production, distribution and consumption of wheat. (The author died before the third volume was written).

The first book, THE OCTOPUS, appeared in 1901 and in it is described the fictional struggle of the California farmer with the railroads pictured by him as a "gigantic parasite fattening upon the life blood of the entire commonwealth."

"Uncouth" Farmers

The great contribution of the railroads in binding together the great land, in providing world markets to the farm products of every part of the nation is left unmentioned. In the end the railroad won out: "The ranchers had been seized in the tentacles of the octopus; the inequitous burden of extortionate freight rates had been imposed like a yoke of iron."

To Norris' imaginary businessman, the wheat growers were but "uncouth brutes of farmhands and petty ranchers." Two years later, followed the second volume (THE PIT) which has the Chicago grain market as its central theme. Typifying the trader is Curtis Jadwin, capitalist and speculator. Jadwin and his fellows, says Norris,

"don't care in the least about grain. But there are thousands upon thousands of farmers out there in Iowa and Kansas or Dakota who do, and hundreds of thousands of poor devils in Europe who care even more than the farmer. I mean the fellows who eat it. It's life or death for either of them. And right between them comes Chicago

speculator, who raises or lowers the price out of all reason, for the benefit of his pocket."

It was the depression of the 1930's that intensified the struggle between farmer and businessman in the minds of the writers of fiction. In 1935, Archibald MacLeish's poem "Panic" took a view expressed by many writers of the period that the depression was all the businessman's doing and no fault was the farmer's:

"Blight — not on the grain
Drought — not in the spring
Rot — not from the rain."

Old Water Trick

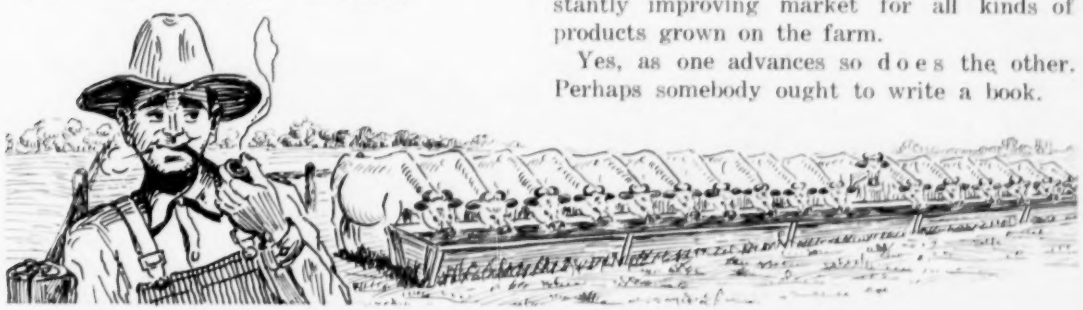
W. E. Woodward in A NEW AMERICAN HISTORY (1938) depicts a businessman preying on other businessmen in the sale of livestock:

"He began his career as a cattle driver, which means that he bought farmers' cattle and drove them to the market to sell. The cattle were sold to the butchers by weight. Just before they got to the market he fed them salt and fed them large quantities of water to drink. A gallon of water weighs about eight pounds, three or four gallons of water in a cow and you have something extra when it comes to selling her."

What the author did not know or failed to mention is that the water trick is probably as old as livestock selling. Would any experienced buyer of cattle have fallen for that one?

A popular modern novelist is John Steinbeck, one of whose books, the GRAPES OF WRATH (1939) deals, in part, with the relationship of farmers and businessmen in the fruit growing areas of the Salinas Valley of California. He paints this picture:

"There is a failure here that topples all our success. The fertile earth, the straight tree rows, the sturdy trunks, and the ripe fruit. And the children dying from pellagra must die because a profit must be taken from an orange."



Story of Conflict

These are but a few samples from the many characters and situations in literature depicting people and their relationships with each other which are far from real life. How it all began, few can say. Some scholars have even held that the literary mind is predeterminedly suspicious of the businessman, while being idealistically sympathetic with the farmer. Perhaps. But literature has too often paid scant compliment to the farmer. Even the amiable Horatio Alger — favorably disposed to both soil and counting house — was likely to see the rural fellow as a bumpkin and fool, easily deceived by the plausible stranger.

It is, of course, a fact that conflict — physical, emotional, or intellectual — is the chief ingredient of good fiction. Where there is no struggle there is usually no novel. And a round between doughty David and avaricious Goliath just makes a better story than two well-matched, clean-fighting welterweights.

Complimentary Function

The truth may not have made fiction as sensational but it is good story material at that. Neither farmer nor businessman could long survive in a world in which they were pitted against each other in a death struggle. One needs the other; neither can exist without the other. Where would the tractor maker be without a farm economy able to buy his products, or the chemical industry, or the steel industry, or the transportation industry?

Who would feed the nation's 52.5 million non-agricultural workers if the farmer were not there to do the job? On the other side of the coin is the contribution of business and industry to farming: its research, its development of new products, its use of farm products in new ways. The growth of employment in non-agricultural fields is providing a constantly improving market for all kinds of products grown on the farm.

Yes, as one advances so does the other. Perhaps somebody ought to write a book.

Anti-Knock Agents For Increased Livestock Production

By Donald C. Boughton, Ph.D.
Research Scientist
E. I. du Pont de Nemours & Co., Inc.

Farm livestock are the living machines through which we process raw materials to obtain desired products. The 1957 models have been developed by selection and breeding. Feeds and forage supply the fuels and intermediates. The end products are meat, hides, eggs and milk. Chemical and pharmaceutical research attempts to supply the catalysts to make the processes operate at maximum efficiency.

At their very best, domestic animals are relatively inefficient at converting feed into useful products. Because they are animals, much of this effort goes into formation of bone, gristle, and feathers, which are only partially useful to us. These difficulties cannot be avoided until science discovers some other means of making milk and meat.

The already low efficiency of animal production is reduced by the hazards that haunt living things in general and domestic animals in particular. Thus, vast amounts of energy, that might go into producing desirable animal products, are consumed by parasites and disease. Federal meat inspectors condemn 4,000 animals each year on the hoof, and parts of 200,000 carcasses are condemned because of this type of contamination. An even larger loss is sustained on the nation's farms, in terms of mortality, morbidity, and inefficient production.

Loss From Pests

An increasingly important field of concern to those engaged in the growing of animals is the loss in production due to low-grade "sub-clinical" infection. Once an animal is obviously stricken, the need for treatment is evident and specific therapy can be applied. When, however, animals harboring low-grade infection appear healthy, there is often no action taken. Research has proven that tolerated disease or parasitic infection can cause serious economic loss in animals that are apparently healthy.

Parasitism and infection are, of course, part of the world of living things. They involve adjustments and tolerances in both the host and the infecting species. If this were not so, either the host or its parasite would have been wiped out in the prehistoric past. Many of the organisms in question depend upon the host for their entire process of living. They themselves are literally a part of the end product which the living machine produces. Thus, some of the productive output is wasted in the manufacture of this useless by-product, the amount depending generally on the degree of infection.

Effect on Production

Thousands of tons of parasites and other organisms are produced annually by the livestock industry, consuming millions of pounds of resources. It is estimated that 7,000 tons of parasitic worms and 1,000 tons of worm eggs are produced in this country each year. It costs at least $1 million in feed to produce these pests. If all of the parasitic organisms lodged in American livestock could be converted to animal protoplasm instead, the net gain would run into millions. In the case of mixed infections with gastrointestinal nematodes of cattle, for example, treated groups gained from .06 to .40 pound per day more than comparable untreated groups, at a profit gain of from $2 to $12.

Some form of parasitism exists in virtually all livestock. Conditions existing in today's animal raising industry make the problem more acute: Overcrowding, unbalanced diets, deficiencies, and forced production. This being the case, methods of eliminating subclinical infestation will make a substantial contribution to the efficiency of production.

Infection Control

Prevention of low-grade infection is usually more efficient than sub-optimal production due to such infection. Besides, good control of chronic or incubating infection in the herd is insurance against costly outbreaks. In seeking ways to cope with infections that inhibit maximum efficiency in the livestock industry, we have been forced into pooling

the knowledge of several specialties. Husbandry and medicine, for example, have offered sanitation and drugs. It has been necessary, too, to alter somewhat the old concepts of feed, disease, and health.

We have passed the point at which only the so-called natural feed materials rate consideration as feed ingredients. A modern feed may owe its efficiency to the incorporated counterparts of the catalysts, lubricants, and anti-knock agents of modern fuels. A chemical capable of advantageously speeding up or slowing down a critical metabolic process may thus promote growth. It could encourage a helpful rumen flora. Or a chemical, such as a wormer or an insecticide, may be used to prevent the inefficiency caused by internal or external parasites. Here the objective is maximum efficiency rather than health in the usual sense, and the chemical is an econmical adjunct to the coordinated sanitary procedures.

Feeds, naturally, are a convenient vehicle for therapeutic doses of medicine and also for carrying into the body any substance we wish to supply on a day-to-day basis—be it an essential vitamin, a stimulating hormone or a prophylactic drug. Continual vigilance is required to prevent disease and parasites from upsetting production efficiency. Daily intake via feeds, therefore, offers one of the best means of using preventive drugs effectively. The broiler industry, with coccidiostats, and the sheep and cattle industries, with anthelmintics, have pioneered. This is only the beginning!

* * * * *

HIGH PROTEIN RATION SAVES PIGS

Gilts fed a 14.3 per cent protein ration during pregnancy raised 92 per cent of their pigs to weaning age, while gilts getting only 10.7 per cent protein weaned only 77 per cent of their pigs, experiments conducted by the University of Minnesota showed. Gilts on both protein levels farrowed the same average number of pigs, but more pigs farrowed by gilts fed the low protein levels got sick and died before they were three weeks old. Most of the pig deaths were caused by baby pig scours. Seventy-one pigs from gilts fed low-protein rations got sick, while only 41 pigs from gilts on high protein feed showed signs of illness.

ELECTRICITY AIDS SEED GERMINATION

A low-frequency electrical energy device has been experimentally used to speed germination of corn seed, prepare soybean seeds for dehydrated processing, and inhibit germination of other seeds. The machine, invented by O. A. Brown of the U. S. Department of Agriculture Experimental Station at Knoxville, may find general application in farming to improve germination, kill weed seeds, and dry grain. Seed is subjected to radiation from a glow discharge at less than atmospheric pressure.

* * * * *

HORMONES PROMOTE WEIGHT GAIN

Implantation of progesterone-estradiol hormone pellets in the ears of steers at the Michigan State University produced nearly one-third greater weight gains. Carcasses of animals with hormone implants yielded greater proportions of lean meat than other animals. The average weight gain of treated animals was three pounds per day, as compared to 2.3 for control steers.

COTTON NOT HURT BY HERBICIDES

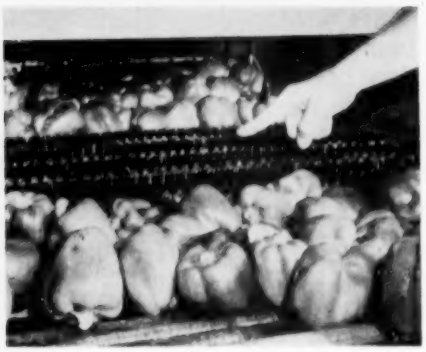
Application of three pre - emergence chemical weed killers did not seriously affect yields of four cotton varieties, according to Dr. R. E. Frans, assistant agronomist, University of Arkansas Experiment Station. The findings were based on three years of work initiated following severe loss of stands in the state in 1952. At that time, several surveys indicated that certain varieties were more susceptible than others to herbicide treatment.

Dr. Frans stated that the use of pre-emergence herbicides should cause no stand reduction, but that a harmful environment during the seedling stage might be aggravated by the use of these chemicals. The varieties used were: Fox, Deltapine 15, Empire WR, and Arkot 2-1. Among the chemicals used in the study was diuron, which is manufactured for use with cotton by Du Pont under the trade name "Karmex" DL.

new PRODUCTS AND APPLICATIONS

A slide valve for irrigation pipe has a weather- resistant neoprene frame with graduation markings that permit accurate, uniform setting for each furrow. The valve is readily adjustable for such conditions as light soil, level or sloping ground, and furrows of any length. Gate area is equivalent to a two-inch round opening. Units are completely recessed and cannot be damaged by rough field handling or storage. They remain watertight under all operating pressures and may be installed on one or both sides of pipes at any spacing. The new valve replaces metal gates in portable irrigation piping. (W. R. Ames Co., San Francisco, Calif.)

* * * * *



Long-lasting Du Pont "Tynex" nylon bristles are made into brushes which perform a variety of jobs in fruit and vegetable preparation for the market. Farm products can be washed, dried, and polished with a minimum of effort and expense through the use of these brushes. "Tynex" bristles have been used as long as three years in washing vats without visible sign of wear. They resist food acids and detergents used in fruit washing. Because of their negligible water absorbency, "Tynex" bristles remain lively. The material will not rot or support bacterial growth or fungi, as do many fibers, even when immersed for long periods.

* * * * *

Temporary storage facilities can be quickly and inexpensively erected with a new inflatable warehouse made of coated Du Pont nylon. The fabric resists sunlight and weathering and provides all-weather protection. A unit containing 64,000 cubic feet weighs only 400 pounds and is contained in a 3 x 5 foot package. To erect the warehouse, an anchor ring is filled with water and the building is then inflated with air, keeping the fabric taut even when the door is open. The Manufacturer, U. S. Rubber Co., plans to produce units from 3,000 to 100,000 square feet.

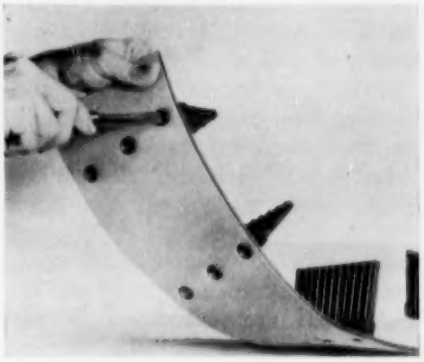
* * * * *

Improved "Fairprene" tarpaulin material is now produced by Du Pont. The material is made of nylon fabric coated on the underside with "Hypalon" synthetic rubber and on the exterior surface with black neoprene. Previously "Fairprene" had been available only with neoprene coating on both sides. The new material retains the wearing properties of neoprene and greater lightness as a result of "Hypalon" coating. Service tests show good resistance to wear inflicted by the rubbing against cargo vehicle.

Development of a new emulsifying system by Du Pont may open a whole new field of pushbutton aerosol packaging by making possible the use of water-based solutions and active ingredients not strictly soluble in commonly used propellants. Laboratory results indicate that the emulsion system may make possible an expanded line of aerosol products including fungicides, bactericides, antiseptics, poison ivy remedies, insect repellents, insect bite lotions, water-soluble antibiotics, plant food, weed killers, leather cleaners, and many other products.

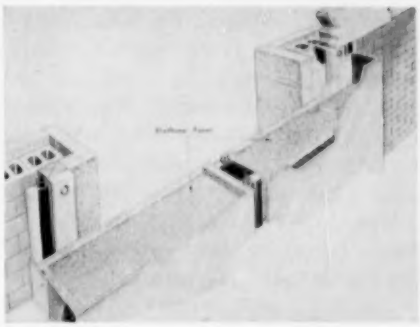
* * * * *

Of particular interest to fruit farmers who do their own packing or processing is a new molded neoprene screw-on cleat that will convert any conveyor or elevator belt into a cleated belt. Cleats can be simply attached with flat-headed screws and special countersunk washers secured to threaded metal inserts vulcanized in the base of the cleat. Because of neoprene's resistance to chemicals, cleats are being used for elevating olives and pickles from corrosive vat solutions. Another important advantage is the ease of changing width and height of cleats or transfer to replacement belts. ("Tatch-A-Cleat" is made by T. H. Hinchcliffe, Pasadena, Calif.)



* * * * *

Less weight and improved insulation for cold storage doors on farms and in food processing is now possible through use of urethane-foam insulation. Weighing only a fraction of conventional insulation, the foam is extremely durable and non-friable. The cellular semi-rigid material provides superior insulation and withstands the vibration and jarring to which cold-storage doors are subjected. Lightness of the door permits an automatic operating device to work efficiently through countless thousands of cycles. (Prest-O-Matic Cold Storage Door is manufactured by Clark Door Co., Inc., Newark, N. J.)



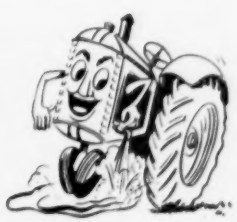
* * * * *

Drain Anti-Freeze From Tractors and Trucks For Efficient Warm-Weather Operation

Every spring, many farmers risk serious damage from overheated tractor and truck engines by neglecting to drain out all winter-worn anti-freeze solutions—particularly the so-called "permanent" types.

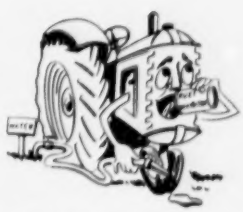
Here are a few spring maintenance tips from cooling system experts of the Du Pont Company, manufacturer of "Zerone" and "Zerex" anti-freezes. They may help avoid expensive repair bills:

Prevent an overheated engine or more serious damage by servicing tractor cooling system for hot weather duty.



Drain out and discard winter-worn anti-freeze from radiator and engine block. (If necessary, flush cooling system with chemical cleaner).

Check cooling system parts for leaks or wear. Replace or repair where necessary.



Refill radiator with fresh water, and add a good rust inhibitor.

Crop Uses of the Substituted Urea Herbicides

By FLORIAN J. OTTO*
Agricultural Service and Development Representative
E. I. Du Pont de Nemours & Co. (Inc.)

Many people think of the substituted urea herbicides only in terms of the 80 per cent monuron wettable powder, which was first known as CMU. Actually, however, Du Pont has prepared and studied over a thousand herbical compounds in this family. At the present time, two, monuron and diuron, are being offered for commercial use. A third, neburon, is being carefully evaluated by Du Pont and by experiment station personnel. A fourth, fenuron, is also being investigated by research people, primarily for control of brush and noxious weeds.

All four are formulated as wettable powders, and we are also studying other formulations such as pellets and liquid suspensions of monuron and diuron. It is the liquid suspension of diuron which is being used commercially for pre-emergent weed control in southern cotton.

Thus far, "Karmex" W monuron herbicide has been registered with the U. S. Department of Agriculture for selective weed control in about ten different crops, including sugar cane, pineapple, asparagus and ornamental bulbs; and, in limited areas, citrus, and irrigated cotton. "Karmex" DW diuron herbicide, which is a newer product, is registered for just as many. Of the two, we expect diuron to be preferred for many crop uses.

Diuron is now recommended for sugar cane, pineapple, cotton, potatoes, and in limited areas for peppermint, cane berries, grass seed crops, and alfalfa. It is expected that grapes may be added to the list this year. In addition, both compounds are registered for use in irrigation and drainage ditches and for spot treatment of perennial weeds in cropland.

Crop Tolerence

In developing selective crop uses of these compounds, we first have to consider the plants involved—particularly in terms of tolerance of the crop versus susceptibility of the weed species. In their inherent effect on most plant species, monuron and diuron are generally considered to be almost equal, while neburon and fenuron are less toxic to most plant life.

Some of the crop plants which seem most tolerant to substituted urea compounds under various conditions of soil type and rainfall are asparagus, sugar cane, pineapple, grapes, and citrus trees.

So far as weeds are concerned, we know, of course, that we can kill germinating seedlings of certain annuals with extremely low dosages, while the chemical must be applied at higher dosages for established annuals and deep-rooted perennials, and even higher for plants which grow from rhizomes or tubers. Some weed species also seem to be more susceptible than others.

Soil Absorption

After considering crop tolerance and weed susceptibility, we must consider soil type. This is especially important since all four substituted ureas are applied only as soil treatments.

When a herbicide is applied to the soil surface, the amount of herbicide that is absorbed by the roots of crop plants or weeds depends to a large extent on the amount of herbicide in solution in the soil water at the root zone. This in turn is influenced by the absorptive capacity of the soil and the solubility of the compound. In general, it has been found that soil adsorption of monuron and diuron increases as the content of organic matter or clay increases. In one experiment, adsorption of monuron was reduced by approximately 85 per cent when the organic matter, which totalled one per cent of the soil, was entirely removed.

In soil adsorption studies, diuron has been adsorbed at higher rates than monuron on all soils tested.

Water Solubility

The third weed control factor which is interacting with soil adsorption and toxicity to plants is water solubility. The wide range of water solubility among the substituted ureas is one characteristic which gives this family of herbicides their versatility. Some of those from higher rainfall areas in the eastern part of the North Central area have found that di-

Excerpt from an address before the North Central Weed Control Conference, Chicago, Ill.

uron is more satisfactory than monuron because it is only about one-sixth as soluble. As you move west into drier areas, monuron, with a solubility of 230 parts per million usually provides better results. If you're looking for even lower solubility, you might want to try neburon which dissolves in water at the rate of five parts per million. This low solubility represents a substantial safety factor which may give neburon a place for chemical weed control in crops where other compounds have not been successful.

When a grower tries any new herbicide for the first time on one of his crops, he usually prefers to make the first trial only on small areas. This is especially important where the operator is not completely familiar with the herbicide itself, or the methods of calibrating application equipment.

Thus far, our greatest range of commercial recommendations for substituted ureas has developed in specific areas of the West. There we have been successful in obtaining weed control with diuron in relatively sensitive crops, such as alfalfa, grass seed crops and peppermint because they are grown in areas where soil, rainfall, and weed species are more or less consistent from one field to another. Where there is any rain at all it usually comes with dependable regularity. Otherwise, irrigation systems put the water supply under the farmer's control.

Winter Control

Another factor in weed control in the Pacific Northwest is that certain crops go dormant in the mild winters, while weeds keep on growing. This is the situation with alfalfa, for example, whether it's grown for hay or seed. With certain other hay and forage crops planted in rows for seed production, it is possible and economical to use chemicals which have not yet been adapted to the same crops in hayfields or pasture in the North Central states.

EFFECTIVENESS OF "KARMEX" diuron herbicide is shown in Long Island potato field treated at planting time, May 5, and photographed June 6. Chemical control saved two cultivations which were required in the check plot during this period.

I mentioned the use of diuron in dormant alfalfa—and the fact that dormancy provides a safety factor for the crop in areas where it is now recommended. We will probably do well to consider other stages in the life of crop plants when they may be especially tolerant of chemicals. We are all familiar with preemergence and post-emergence timing as a critical factor in the application of chemicals to certain crops.

Another aspect of timing which may be appropriate in the North Central states is the possibility of chemical applications at lay-by time to develop ways to get the chemical on without damaging the crop. Lay-by treatment is proving successful in irrigated cotton in Arizona, and it looks promising for potatoes in the North Central area, and possibly for other crops. At lay-by, the crop plant is stronger than in earlier stages, and may be more tolerant of the chemical. However, we need to know more about the effect of lay-by applications on both weeds and crops.

One of the greatest safety factors is in the properties of the compound itself. The properties of neburon, for example, make it look promising for selective weed control on such crops as carrots, tomatoes, spinach, cabbage, beans, soybeans, strawberries, celery, onions, beets, cantaloupes, small grains, peanuts, and various other crops where chemical weed control has been difficult or impossible.

Residue Tolerances

The substituted ureas, like all other agricultural chemicals, are subject to registration with the U. S. Department of Agriculture, and for food crops, residue tolerances must be established by the Food and Drug Administration. Tolerances have now been established for monuron and diuron in sugar cane, pineapple, and cotton seed, and for monuron in asparagus, spinach, citrus fruits and grapes. There is also a tolerance for diuron in alfalfa, potatoes, and hay from grass seed crops. Hay from grass and alfalfa grown for seed in the Pacific Northwest is now permitted to be fed to livestock after treatment with diuron. For a few

crops, recommendations have been established without any tolerance when it has been found after repeated analysis that none of the chemical appears in the final product.

This brief review of developments in crop uses of the substituted urea herbicides gives you a record of important findings and success thus far, and we hope that what has been learned in other areas can lead to similar success in the North Central states. There is considerable challenge to cut the labor investment in crop weed control, and cut the losses which uncontrolled weeds cause in crop production.

Experience with the substituted ureas thus far shows that many factors enter into the performance and economic usefulness of these products in crops. We are approaching our substituted urea studies in the North Central area with the same kind of analytical thinking, with the expectation that we will extend this versatile family of chemicals into many other crop uses.

HEREDITY EFFECT ON PRODUCTION

The capacity for egg production in chickens and rates of gain in calves are known to be heritable, according to a report from the Texas A & M College. Enough evidence has been obtained to indicate that such productivity in animals can be related in part to the chemistry of the blood and other tissues such as the glutathione level of red blood cells and the protein-bound iodine in the serum.

Also, body chemistry has been found to be genetically controlled, giving promise of a means of understanding the kind of metabolism controlling the heritable differences in growth and egg production.

These findings also give promise of a means of selecting animals for productivity without expensive and time-consuming feeding tests.

FAMILY LIVING STANDARDS RISE

The number of families owning automobiles increased from 54 per cent in 1948 to 73 per cent in 1956. Percentage of electrically wired homes with mechanical refrigerators increased from 77 to 94 per cent; homes with washing machines went up from 67 to 84 per cent.

DDT Safety Factor Established

Present levels of DDT (chlorophenothane) in the diet of American consumers are not injurious to health, according to a research report appearing in the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.* The experiment was carried out with 51 men volunteers, one third of whom received no DDT except as it occurred in their ordinary diet, one third received 3.5 mg. per day, and the remaining group 35 mg. per day (about 200 times the average daily rate of DDT in the normal diet). During the course of the experiments, 126 complete sets of examinations were carried out on the men.

The subjects were given complete physical examinations, including weight, blood analysis, heart rate, blood and pulse pressure, and plasma cholinesterase level. "Although changes are observed in all of these values," the report states, "none were correlated consistently with increased dosage of DDT or with increased duration of exposure. Since the changes were random in distribution and degree, they must be attributed to normal variation."

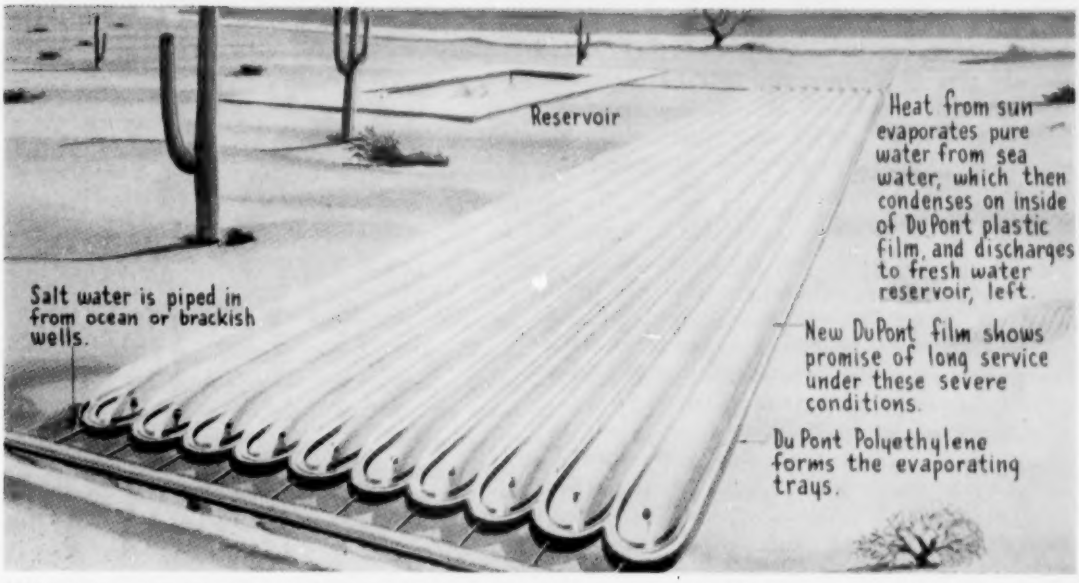
Since one of the major effects of DDT is on the nervous system, extensive neurological examinations were also made, including a variety of sensory and motor tests. According to the report, "all of the participants remained normal in regard to these neurological tests; of particular interest, they showed no loss of coordination and no indication of tremor."

During the entire study, the report concludes, "no volunteer complained of any symptom or showed, by the tests used, any sign of illness that did not have an easily recognized cause clearly unrelated to exposure to DDT . . . The results indicate that a large safety factor is associated with DDT as it now occurs in the general diet."

---

* *Wayland J. Hayes, Jr., M. D., William F. Durham, M. D., and Cipriano Cueto, Jr., Ph.D.: The Effect of Known Repeated Oral Doses of Chlorophenothane (DDT) in Man, JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, October 27, 1956, Vol. 162.*

Sun's Energy May Provide Water For Parched Lands


Reservoir
Heat from sun evaporates pure water from sea water, which then condenses on inside of DuPont plastic film, and discharges to fresh water reservoir, left.
Salt water is piped in from ocean or brackish wells.
New DuPont film shows promise of long service under these severe conditions.
Du Pont Polyethylene forms the evaporating trays.

SOLAR STILL under study by Du Pont may someday permit tapping of oceans or brackish inland sources for fresh water. Artists' drawing shows how still made of Du Pont plastic film operates.

With the specter of the dust bowl hanging over drought-stricken areas of the country, a new Du Pont project may provide an answer to the dreams of thousands of farmers for a relatively cheap source of fresh water. Under agreement with the U. S. Department of the Interior, the Company is developing experimental stills for conversion of salt or brackish water into fresh water through the use of solar heat.

Tests carried on over a number of years have shown that fresh water can be produced on a large scale by distilling salt water with heat from the sun. The goal has been reducing the cost to where such operations can be economically justified. Experiments have been carried on in the design of low-cost stills, as well as increasing capacity of more complex units.

The possibility of success became apparent with the development by Du Pont of economical, long-lasting plastic materials. One of these, a new type of tetrafluorethylene resin transparent film, will withstand an estimated 10 years of outdoor exposure. The Du Pont experimental still features a plastic evaporating pan and a transparent canopy, supported only by air pressure, without rigid supports. Energy from the sun is trapped between the base and the canopy, and is used to evaporate the salt water. Condensed salt-free water is discharged into a reservoir.

Practical development of a simple still of this type may bring needed water for

ANCIENT EGYPTIAN cultivators using human power to raise Nile River water.

ROMAN ACQUEDUCT represents elaborate works often built to supply water needs.

SOLAR STILL may convert salt water of oceans and seas into usable fresh water.

animals to many areas where water is now absent, inadequate, or brackish. It could provide essential stability to livestock-raising in sections that have marginal or fluctuating water supplies. Its development could also be an aid in hydroponics and greenhouse operations. The outcome of extensive research and engineering studies will demonstrate if such applications can be made physically or economically practicable.

Should this type of operation become a reality, it will mean the first basic change in the method of obtaining large-scale supplies of water for humans, animals, and crops. The most primitive agricultural communities used essentially the same process of providing needed water as is used today—channeling or piping suitable fresh water to where it is needed. The only difference is that mechanical power has replaced the human and animal labor of the past, and better materials are used for the construction of water facilities.

Many evidences of ancient water-carrying methods or devices have survived. Both simple and elaborate means have been developed, from leather bag to the monumental aqueducts of the Roman Empire. As populations grew, the sources of water became less and less adequate for survival in many areas. Always man looked with jealous eye upon the seemingly endless oceans. And always the dream of turning salt water easily into fresh was there.

Today, science may well be on the threshold of making that dream into reality.

AGE INCREASES PROTEIN NEED

Recent findings that older people need a higher proportion of amino acids in the diet may have significance to food producers and distributors. An experiment with five men aged 52 to 68 by a research team from the University of California at Los Angeles showed that amino acid levels previously found to be satisfactory in the case of younger men were not adequate for the test group. The study indicates that the need for one or more of the essential amino acids increases with age.

Report on Low-Level Phenothiazine Fed to Cattle in Combination with Stilbestrol

In an effort to determine the possible effectiveness of feeding phenothiazine in combination with stilbestrol, workers at the Dixon Springs Experiment Station included the combination in a recent feed-lot experiment. This treatment was compared to stilbestrol only, low-level phenothiazine only and controls. The results are summarized below.

Gain and Efficiency of Gain
126-Day Trial

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
	Control	Stilbestrol 1st half	Stilbestrol 2nd half	Stilbestrol throughout	Phenothiazine throughout	Phenothiazine Stilbestrol
No. Steers	10	10	10	10	10	10
Average daily gain, lb.	2.18	2.47	2.39	2.25	2.24	2.46
TDN per cwt. gain, lb.	695	623	602	625	662	662

(EDITOR'S NOTE: Phenothiazine-stilbestrol in combination is classified as a "new drug" requiring the filing of a new drug application.)

* Feeding Stilbestrol and Phenothiazine to Yearling Steers During the Fattening Period. DIXON SPRINGS EXPERIMENT STATION, PROGRESS REPORT. 1956. Illinois Agricultural Experiment Station Expt. No. 30:15.

the farmer gets less because...

TAXES ARE A COST OF DOING BUSINESS

The spread between the price a farmer receives for his product and the price the ultimate consumer pays is due, in part, to the taxes paid by businesses that handle or process the commodities between farm and user.

It is recognized today that taxes are a cost of doing business—just as are labor, raw materials, and tools. If taxes on business rise or increase in number, prices must eventually rise, too, unless there are improvements in the handling and production processes.

Under these circumstances, the rising tax bill for business has been reflected in the rising price structure, and a portion of the growing price spread on agricultural products has resulted from the higher taxes paid by processors, shippers, dealers, and others. Obviously a company that has to pay a large franchise or corporate tax must make more income to make ends meet than when its taxes are low.

Hidden Taxes Cumulate

As hidden taxes pile up, prices will rise without a proportionate share going to the producer or processor of the product involved. In recent years, substantial increases have taken place in the taxes levied on business or business activity. This rise has been especially evident on the state level. Taxes directly collected from business by the states have increased 10 per cent each of the past 11 years. In 1946, such taxes amounted to $1 billion, in 1956 to $2.6 billion, an increase of 148 per cent. During the same period the actual income of the firms paying the tax went up only 60 per cent; most of the remainder, therefore, had to come from other sources, largely prices.

The way hidden taxes pile up on every product using the output of agriculture is shown in a Tax Foundation report that 151 taxes are included in the cost of a loaf of bread, 100 on an egg, 116 on a suit, and 600 on a house. The first tax that must be figured into the cost of bread is the real estate tax paid by the farmer on his land, which to him is a cost of doing business. Then there are corporate and franchise taxes on each of the businesses involved in the baking and distributing process; excise taxes on all the trucks, railroads, ships, and machinery involved; taxes on gasoline and motor oil; telephone taxes; and many others.

Each Step Taxed

The number of taxes multiply rapidly because of the complexity of today's productive process. In the making of bread, for example, these and other businesses will be involved, in addition to the farmer who grows the wheat: manufacturer of farm machinery, truck manufacturer, seed dealer, miller, milling machine maker, bag maker, baker, baking machine maker, grocer, paper maker, printer, parafin maker, telephone company, transportation companies, newspapers and television (for advertising), chemical companies (for additives), shortening maker, and salt maker.

The price spread caused by pyramiding hidden taxes is substantial. On an automobile costing $3,500, the hidden total is about $875, on a 25-cent pack of cigarettes it is 11 cents, on a $5.50 telephone bill the tax runs $1.15, on a new color TV set it is about $118, a shirt costing $3.50 includes 50 cents, and a loaf of bread would be three cents cheaper without hidden taxes.

Taxes Take One Third

Taxes—including all federal, state, and local levies—now amount to over $100 billion per year, or approximately one-third of the earnings of the population. That means that every dollar earned loses one third of its purchasing power through direct and hidden taxes.

An average family with an annual income of $3,500 will lose over $1,000 of its purchasing power in direct and hidden taxes. A family earning $4,500 per year pays a total tax bill amounting to over $1,400, while an

income of $7,500 costs more than $2,600 in taxes.

Even the steep increases in the personal income tax often have an effect on prices.

Take the case of movie stars and television entertainers who must be paid fabulous fees for single appearances because of taxes. An actor in the 91 per cent bracket must get $10,000 for an appearance just so he can keep $900. The bill for the higher pay ultimately reaches the consumer who goes to the movies or enjoys the entertainment. An executive of an industry which may employ thousands of workers and serves millions of consumers must receive about $200,000 per year to have an effective salary of $50,000.

In view of these facts, it is important that tax policy be established with the ultimate effect on the nation as a whole in view. No group of persons or segment of the economy can be singled out for "soaking" without effect on the entire economy. As farmers and businessmen both know, taxes are a cost of doing business and they can only be paid by the people who use the products and services made by them.

Du Pont Grants One Million Dollars To Education

The Du Pont Company has allocated more than $1,000,000 for grants to 122 universities and colleges in its annual program of aid to education for the 1957-58 academic year, a substantial increase over the $900,000 in gifts made this year.

Nearly all of the increase and more than half of the entire sum are for improvement of teaching in universities, colleges, and high schools. The grants will support science and mathematics as well as other subjects.

Growth of the Du Pont program—which began in 1918—as well as the change in emphasis, reflects the changing needs of the schools. At the same time, grants for fellowships in science, which once made up the entire program, and for fundamental research are being continued.

A major problem brought on by the increasing student population is to maintain high quality of teaching, and at the same time, develop enough teachers. The largest share of Du Pont's grants is designed to assist educational institutions in meeting this situation.

The company is awarding $585,000 to nearly 100 colleges and privately supported universities to advance the teaching of science, mathematics, and other fundamental liberal arts subjects. Du Pont considers science and mathematics as a vital part of liberal arts education, as well as fundamental to the education of scientists and engineers. The laboratory sciences, of all the basic courses, are the most expensive to teach.

In addition, the company awarded 98 teachers' fellowships to five institutions for the coming summer to help in-service teachers who are taking summer work for advanced degrees. A major objective is to encourage development among teachers of a greater knowledge of the subjects they teach. Awards were made to institutions in which curricula for master's degrees in teaching include substantial emphasis on science and mathematics.

The company is granting $290,000 to universities for fundamental research and $165,000 for post-graduate fellowships in science and engineering. Included in the authorization for research are grants-in-aid of $15,000 each to 10 universities and $10,000 each to nine others. There are also summer research grants of $1,500 each to 20 universities. These are to enable younger staff members of university chemistry departments to undertake research of their own during the summer months.

Under its oldest program—post-graduate fellowships in scientific fields—the company is awarding 43 fellowships for the next academic year. There are 13 in chemistry, 16 in chemical engineering, six in biochemistry, four in mechanical engineering, and two each in physics and metallurgy.

As has been the case in previous years, Du Pont is making the awards to the colleges and universities and leaving decisions on detailed use of the funds up to them.

Farmers Ask About . . . .

Q: How does urea function as a cattle feed?

A: Although urea is no foodstuff in itself, the body chemistry of ruminants converts the nitrogen in this compound into useful animal proteins. Urea partly takes the place of natural protein feeds, such as soybeans, cotton seed and linseed meal.

* * * * *

Q: Can wheat straw be used to make paper?

A: Newsprint containing 30 per cent or more wheat-straw pulp has been experimentally produced and successfully used in printing.

* * * * *

Q: What is the relative service life of white housepaint as compared to colored?

A: Good quality white paint should last at least four or five years; tinted paint, five or six years; and dark color paint, six to eight years.

* * * * *

Q: What has happened to fertilizer prices since the prewar period?

A: Although the price of fertilizers has increased an average of 50 per cent since 1939, the concentration of plant food in fertilizers has risen 36 per cent. Thus the actual price increase, when based on food content, is only about 10 per cent.

* * * * *

Q: How rapidly do high temperatures deteriorate fruit and vegetables?

A: Fresh fruit and vegetables deteriorate as much in one hour at 90 degrees as in a whole day at 50 degrees or a week at 32 degrees, according to a report from the University of California.

* * * * *

Q: How many people are engaged in getting food from farm to consumer?

A: About 5 million people, or close to 10 per cent of the non-agricultural work force of the nation.

* * * * *

Q: What is the principal effect of cotton seed treatment with chemicals?

A: The greatest value is protection against seed rot and other externally-borne disease organisms, such as anthracnose and bacterial blight.

* * * * *

Q: How do chemicals rank as a cause of farm injuries?

A: Misuse of farm chemicals is 12th on the list of farm accident causes, accounting for only 1.7 per cent of the total. Striking objects are first with 16 per cent; lifting objects is second with about 15 per cent.

* * * * *

Q: How can paint be safely and quickly removed?

A: Paint removers using methylene chloride gives the widest and fastest action of any nonflamable paint removers. The material can be applied by spraying, brushing or dipping. The paint coating treated with methylene chloride swells and is lifted off the surface, making removal easier.

* * * * *

Q: Is vitamin A supplementation needed for cattle during seasons when pasture is not available?

A: Tests made at the Oklahoma Agricultural Experiment Station indicate that mature beef cows which have access to green pasture during the summer can go for more than nine months without carotene supplementation.

* * * * *

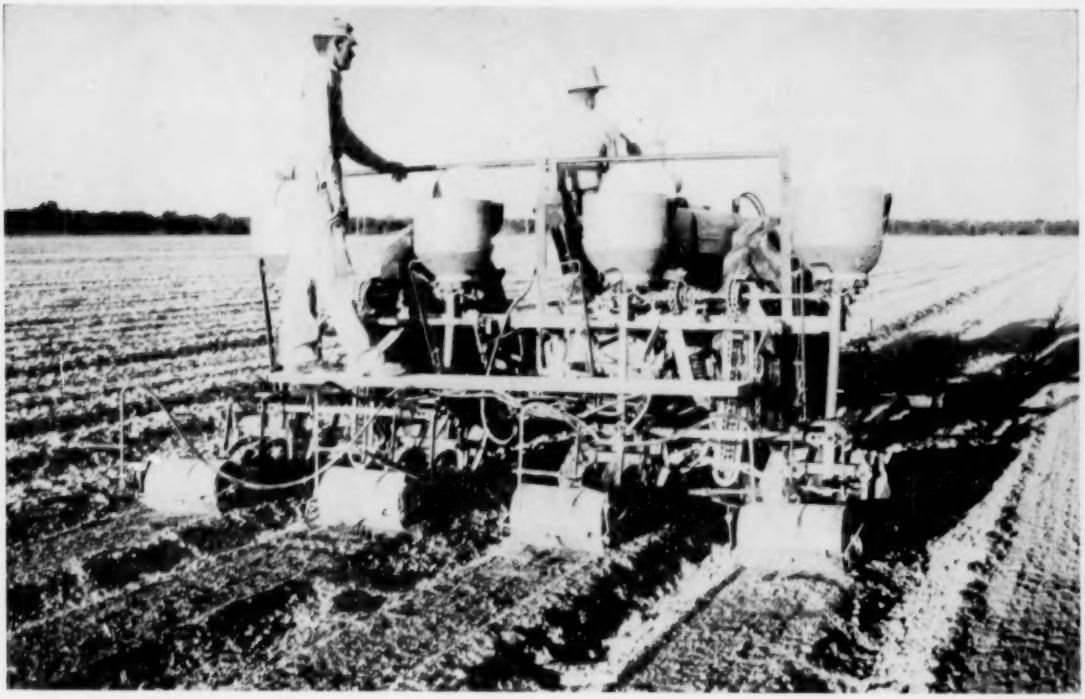
Q: Is sodium essential for plant growth?

A: Although sodium is found in plants, there is no showing that it is necessary for growth. Some plants do, however, respond to sodium addition. This element is also useful when a potassium deficiency is present.

* * * * *

Q: Do lice species generally invade more than one host species?

A: Most lice species are limited to a single host and it has been suggested that evolutionary affinities of animals and birds may be shown by the types of lice with which they are infested.



* Two operations in one. This rig is planting cotton and applying Du Pont Karmex * DL to control weeds so the cotton can grow with less hoeing

Every Year chemistry finds new ways to increase your efficiency and cut your costs

You and most of your neighbors are farming better today than ever before. And, to do so, you use more and more of the results of chemical research.

An outstanding example is "Karmex" DL. It's a weed killer developed by Du Pont and known to chemists as a substituted urea herbicide. When sprayed on the soil at the same time cotton is planted, it controls weeds up to eight weeks and saves as many as four hoeings.

While weed control in cotton is one of the first uses for "Karmex" DL, other formulations of "Karmex" are giving outstanding results in asparagus, citrus, suger cane and grapes at low rates of application. With other crops, the search goes on to find the right formulations and to work out the best methods for using them.

"Karmex" plays an equally important role in keeping irrigation and drainage ditches free of weeds. One application controls weeds for a season or longer, saving the cost of hand maintenance and reducing the loss of water due to weeds.

"Karmex" is another example of how Du Pont chemistry helps the American farmer do a better job and do it easier.

On all chemicals, follow label instructions and warnings carefully

DU PONT
REG U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

(This advertisement was published in the "National Future Farmer," February & March 1957).